UNITED STATES PATENT AND TRADEMARK OFFICE

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YOUNG & THOMPSON
209 Madison Street
Suite 500
ALEXANDRIA, VA 22314

EXAMINER
COLUCCI, MICHAEL C

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

	Application No.	Applicant(s)
Office Action Summary	10/520,171	HYVONEN, JORKKI
	Examiner	Art Unit	
	MICHAEL C. COLUCCI	2626	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
  Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☒ This action is **FINAL.**   2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle,* 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) <u>8-11 and 14-16</u> is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) <u>8-11 and 14-16</u> is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on <u>04 January 2005</u> is/are: a)☒ accepted or b)☐ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☒ All b)☐ Some * c)☐ None of:

       1.☐ Certified copies of the priority documents have been received.

       2.☐ Certified copies of the priority documents have been received in Application No. _____.

       3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1)☐ Notice of References Cited (PTO-892)

2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3)☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.

4)☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.

5)☐ Notice of Informal Patent Application

6)☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 101

1.   35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

Claim 15 is rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.

As per the claims, the language "loadable with a computer readable medium encoded with a computer program" do not transform the claimed subject matter into statutory subject matter. The recital is merely a field of use or desired end use limitation. A mathematical algorithm is not made statutory by "attempting to limit the use of the formula to a particular technological environment." <u>Diehr</u>, 450 U.S. at 191, 209 USPQ at 10. Thus, "field of use" or "end of use" limitations in the claim preamble are insufficient to constitute a statutory process.

Claim 15 directly recites a mathematical algorithm by setting forth the steps of:

An apparatus "loadable with a computer readable medium encoded with a computer program"

These steps are mathematical in nature.

Claims to processes that do nothing more than solve mathematical problems or manipulate abstract ideas or concepts are complex to analyze and are addressed herein.

If the "acts" of a claimed process manipulate only numbers, abstract concepts or ideas, or signals representing any of the foregoing, the acts are not being applied to appropriate subject matter. Benson, 409 U.S. at 71-72, 175 USPQ at 676. Thus, a process consisting solely of mathematical operations, i.e., converting one set of numbers into another set of numbers, does not manipulate appropriate subject matter and thus cannot constitute a statutory process.

The claimed subject matter must contain more than 35 USC 101 judicial material, such as an application which involves the 101 subject matter. Particularly, there must be a result that is useful, tangible, and concrete. The claimed subject matter within claim 15 contains material that lack tangibility, where a real world result is produced. Examiner takes the position that the recited claim 15 is merely <u>mathematical in nature</u>, where the process of an apparatus "loadable with a computer readable medium encoded with a computer program" does not produce a tangible result. NOTE: "loadable", when read in light of the specification is <u>NOT</u> construed to be functionally equivalent and equally effective to <u>loaded</u>.

Claim Rejections - 35 USC § 112

2.   The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3.   Claims 8-11, 14, and 15 are rejected under 35 U.S.C. 112, first paragraph, as

failing to comply with the written description requirement. The claim(s) contains subject

matter which was not described in the specification in such a way as to reasonably

convey to one skilled in the relevant art that the inventor(s), at the time the application

was filed, had possession of the claimed invention. A computer readable medium is not

disclosed or supported within the specification of the present invention.

4.   The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly
> claiming the subject matter which the applicant regards as his invention.

Claim 15 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for

failing to particularly point out and distinctly claim the subject matter which applicant

regards as the invention. The term "loadable", when read in light of the specification

does not allow one of ordinary skill in the art to determine the scope of the claim in view

of such as term, and is therefore rendered indefinite. For the purposes of prior art, the

term "loadable", when read in light of the specification is NOT construed to be

functionally equivalent and equally effective to <u>loaded</u>.

Response to Arguments

5.   Applicant's arguments filed 06/30/2008 have been fully considered but they are

not persuasive.

Argument 1 (page 10 paragraph 6):

- "Moreover, even if a person skilled in the art would for some reason

  consider KWOK, the skilled person would not arrive at the claimed

  invention. The reason is that KWOK teaches that the edit distance, in

  other words distance, between words should be calculated by taking into

  account each letter in the word. (See "cat/cot" in paragraph [0062] of

  KWOK, for instance). Such a solution does not meet the recited claims."

  AND

- "Rather, such growth search teaches away from a length comparison and

  it would be opposed to the teachings of BALLARD to carry out a

  calculation of the length difference as recited"

Response to argument 1 :

NOTE: Examiner construes the use of symbols in a search string as

mentioned in the previous invention (searching [0016, symbol [0008],

[0031-0033]) to be functionally equivalent and equally effective to the letters

within a string as taught by both *Ballard* (Col. . 6 lines 46-67) and *Kwok*

(Kwok [0037]).

Examiner maintains the position that both Ballard et al. US 5377281 A

(hereinafter Ballard) and Kwok et al. US 20020165873 A1 (hereinafter Kwok) in

fact teach search sequence/routines to finding the differences/similarities between strings. For the aforementioned reasons related to searching methods, Examiner does not believe that the incorporation of Kwok is not proper and also does not teach away from the present invention. Ballard teaches that in order to assist in the search procedure itself, a body of knowledge is created which comprises word prefixes, word lengths, and the most likely words that are associated with the word prefixes. One and two letter word prefixes are employed in our implementation but, of course, table with still longer prefixes are beneficial, as long as the derived benefits are not too dear in terms of the increased memory requirement. In our implementation, for example, a word such as "below" is associated with the prefixes "b", "be", and "bel". Although "below" may not be the most likely word with the prefix "b", it is still a valid word that may be selected when he prefix is "b". Similarly, although "below" may not be the most likely word with the prefix "bel", it is still a valid word that may be selected when the prefix is "bel". Longer prefixes are, of course, possible. The word length in our embodiment is not merely the number of characters. Rather, as suggested above, character widths are incorporated in the length calculation. For example, the length of "b"=2, "e"=2, "l"=1, "o"=2, and "w"=3. Therefore, the length of the string "below" is 8. From among words with a length 8 and a prefix "bel", the word "below" may indeed be the most likely word (Col. 6 lines 46-67).

Further, Ballard teaches as in the training phase and creation of the tables described above, the system is ready to accept lines of text perceived by the OCR equipment. The lines of text contain strings of characters that are typically delimited, such as with a space interval. The space is typically accounted for with a space character. Each of the delimited strings of characters has a meaning. In text, such as a newspaper story, each of the strings is a natural language word, optionally with punctuations attached. The branch-and-bound procedure described below operates on the delimited strings of characters. The procedure analyzes the line of text by individually analyzing the delimited strings of characters that make up the line of text and the analysis is typically carried out in the order of character string appearance in the line of text. The branch-and-bound procedure is a relatively conventional procedure of traveling through branches and nodes of a trie, such as shown in FIG. 4. Lines from one node (dark circle) to another node are branches of the trie, and the leaf-looking icons attached to some nodes are leaves of the trie. The idea is that when a string of characters is presented, one travels from the root (at the top of FIG. 4) to a leaf. The travel is from one node to the next, via branches that connect the nodes, associating each branch with an executed rewrite rule. While traversing a branch, an "expense" is incurred in connection with the traversal of the branch; i.e., with the executed rewrite. That expense is the $-10\log p$, where p is the rewrite probability in the rewrite probabilities table. In our arrangement, there is

also an expense in selecting a leaf. This is the expense found in the uni-gram

word probabilities table (Col. . 7 lines 10-44 & Fig. 4).

Though Ballard teaches scoring and probabilistic based word searching using a

well known "trie" or retrieval method, Kwok has been incorporated to address

distance calculation, more specifically in a search routine for discourse

containing strings, wherein all arts of a string are considered during an analysis.

The teachings of Ballard relevant to a trie data structure (as taught in the present

invention) in view of Kwok in fact render obvious the search methods relevant to

a distance calculation, wherein scores are calculated as a point of reference to

search through the next symbol.

Kwok teaches and admits that search routines of discourse is well known in the

art, wherein Kwok in fact clearly teaches a <u>rank-based keyword measure</u>. The

<u>traditional text search, also called a simple keyword score, can be enhanced by</u>

<u>including words other than the highest scoring word from the recognition stack</u>

<u>generated by a recognition model.</u> In a rank-based keyword measure, <u>multiple</u>

<u>words from a recognition stack are selected and ranked</u>. For instance, the top

three words from the recognition stack could be selected and weighted by rank:

1.0 for the top word; 0.2 for the second word; and 0.04 for the third word. <u>New</u>

<u>word scores are determined by multiplying the old word score by the weight</u>. An

"expanded" document is essentially created, which has three weighted
alternative text words for each handwritten word. The system then searches
through this expanded document for a single search term that corresponds to
one word of the query stack. Each word of the query stack is used as the single
search term until each word of the query stack has been used to search through
the document. Illustratively, the document score is the sum of the rank weights
for each match, between a word in a query stack and a word in a document
stack, in the expanded document. This document score will always be equal to
or greater than the simple keyword document score. It should be noted that this
is only one technique for creating a document score, and other techniques will be
apparent to those skilled in the art (Kwok [0037]).

Kwok also teaches, as cited in the previous office action, that the present
invention demonstrates an edit distance. An edit distance is a measure of
"distance" between two words. It can be thought of as a measure of the similarity
(or non-similarity) between two words. A simple measure of the edit distance is
the number of characters that are different between two words. For example, the
two words "cat" and "cot" differ in one character position, and the edit distance
would therefore be one. Using this definition, a measure of edit difference could
be determined through the following formula: (worst case edit distance-edit

distance)/worst case edit distance. In the latter example, this is (3-1)/3, or 2/3.

Thus, as edit distance increases, the edit distance measure decreases (Kwok

[0062]).

Examiner construes the use of the score of an edit distance to be functionally

equivalent and equally effective to a reference value, wherein it would have been

obvious to combine the well known teachings of Ballard's trie structure analysis

method with Kwok's search routine and distance analysis based on

letter/characters/symbols in discourse/text/strings.

Claim Rejections - 35 USC § 103

6.   The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set
> forth in section 102 of this title, if the differences between the subject matter sought to be patented and
> the prior art are such that the subject matter as a whole would have been obvious at the time the
> invention was made to a person having ordinary skill in the art to which said subject matter pertains.
> Patentability shall not be negatived by the manner in which the invention was made.

7.   Claims 8-11 and 14-16 are rejected under 35 U.S.C. 103(a) as being

unpatentable over Ballard et al US 5377281 A (herein after Ballard) in view of Kwok et

al. US 20020165873 A1 (hereinafter Kwok).

Re claims 8, 15, and 16, Ballard teaches computer readable medium encoded

with a computer program for executing a method for searching for an input symbol

string (Col. 7 line 60 – Col. 8 line 52) among a set of symbol strings, comprising:

creating a trie data structure (Fig. 4 & Col. 7 line 10-36) of symbol strings, wherein the

symbol strings are grouped into branches in such a manner that the symbol strings

beginning with the same symbols belong to the same branch (Col. 7 line 10-36), and

the symbol strings in the same branch divide into new branches at the symbols (Col. 7

line 10-36), from which onwards the symbols strings differ from each other, receiving an

input formed of an input symbol string, proceeding from the starting point of the trie data

structure along a branch to a calculation point indicated by the next symbol (Fig. 4).

Calculating distances at the calculation point between a sample symbol string

formed by the symbols of the calculation point of the branch in question and the

calculation points preceding it and the input symbol string by comparing (Col. 7 line 60

– Col. 8 line 52) these in alternative ways (Col. 7 line 60 – Col. 8 line 52).

Selecting repeatedly the next branch to follow to the calculation point indicated

by the next symbol (Fig. 6 & fig. 7), at which said calculation is repeated for the new

calculation point (Fig. 6 & fig. 7), said selection of the next branch being performed in

such a manner that next the routine (Fig. 6 & fig. 7) proceeds from the calculation point,

from which the lowest reference value has been obtained as result (Ballard fig. 6 & fig.

7).

After the calculation has terminated (Fig. 6 and fig. 7), selecting one or more

symbol strings (Fig. 6 and fig. 7) having the shortest distance (Col. 9 lines 46-68) to the

input symbol string on the basis of the performed calculations, and using the selected

symbol string(s) (Ballard Col. 7 line 60 – Col. 8 line 52) to produce a response (Ballard

fig. 5)

However, Ballard fails to teach calculating at the calculation point also the
smallest possible length difference (Kwok [0062]) corresponding to each distance that
indicates how much the length of the remaining part of the input symbol string not
examined in the distance calculation differs from the lengths remaining in the symbols
strings passing through the calculation point, and calculating on the basis of each
distance and corresponding length difference a reference value (Kwok [0062]).

Kwok teaches an edit distance is a measure of "distance" between two words. It
can be thought of as a measure of the similarity (or non-similarity) between two words.
A simple measure of the edit distance is the number of characters that are different
between two words. For example, the two words "cat" and "cot" differ in one character
position, and the edit distance would therefore be one. Using this definition, a measure
of edit difference could be determined through the following formula: (worst case edit
distance-edit distance)/worst case edit distance. In the latter example, this is (3-1)/3, or
2/3. Thus, as edit distance increases, the edit distance measure decreases.

Kwok also teaches an edit distance between a words "tame" and "lame" may be
less than one, because it is likely that a writer simply did not cross the "t" in the word.
Note that the edit distance measure in this case increases from that calculated in the
example of the last paragraph. As another example, an edit distance between the
words "man" and "can" may be larger than one, because it is unlikely that the characters
"m" and "c" would be written in a confusingly similar manner.

Kwok teaches and admits that search routines of discourse is well known in the
art, wherein Kwok in fact clearly teaches a rank-based keyword measure. The

traditional text search, also called a simple keyword score, can be enhanced by

including words other than the highest scoring word from the recognition stack

generated by a recognition model. In a rank-based keyword measure, multiple words

from a recognition stack are selected and ranked. For instance, the top three words

from the recognition stack could be selected and weighted by rank: 1.0 for the top word;

0.2 for the second word; and 0.04 for the third word. New word scores are determined

by multiplying the old word score by the weight. An "expanded" document is essentially

created, which has three weighted alternative text words for each handwritten word.

The system then searches through this expanded document for a single search term

that corresponds to one word of the query stack. Each word of the query stack is used

as the single search term until each word of the query stack has been used to search

through the document. Illustratively, the document score is the sum of the rank weights

for each match, between a word in a query stack and a word in a document stack, in the

expanded document. This document score will always be equal to or greater than the

simple keyword document score. It should be noted that this is only one technique for

creating a document score, and other techniques will be apparent to those skilled in the

art (Kwok [0037]).

Therefore, it would have been obvious to one of ordinary skill in the art at the

time of the invention to modify the system of Ballard to incorporate the smallest possible

length difference indicating how much the length of the remaining part of the input

symbol differs from the lengths remaining in the symbol string as taught by Kwok to

allow for   the ranking of the most probable data when comparing in input string to

possible candidates in a trie, where various of a word can be discarded based on the

edit distance and edit difference, wherein additionally, using a difference value can be

used to further narrow a set of candidates through the use of probabilities such as the

difference value divided by the worst possible difference present (Kwok [0037]).

Re claim 9, Ballard teaches a method as claimed in claim 8, comprising

comparing the distance of the symbol string or strings used to produce the response

(Fig. 6 & fig. 7) and that of the input symbol string with a predefined maximum distance

(Col. 8 line 30-41), and changing the produced response to indicate that the input

symbol string was not found if the distance exceeds the maximum distance (Ballard Col.

8 line 30-41 & fig. 6 & fig. 7)

Re claim 10 and 14, Ballard teaches a method as claimed in claim 8, comprising

when selecting the branch (Col. 7 line 10-36 & fig. 4), comparing said lowest reference

value with the predefined maximum distance (Fig. 6 & fig. 7), and terminating the

calculation if the lowest reference value exceeds the maximum distance (Col. 9 lines

46-68 Fig. 6 & fig. 7)

Re claim 11, Ballard teaches a method as claimed in claim 8, comprising when

selecting the branch, checking whether calculation is already done for the last

calculation point on one of the branches distance (fig. 6 & fig. 7), and terminating the

calculation, if it turns out that for the last calculation point of one of the branches a

reference value has been obtained that is lower than the reference values obtained for

all the other calculation points distance (Col. 9 lines 46-68 & fig. 6 & fig. 7).

Conclusion

8.   **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time

policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE

MONTHS from the mailing date of this action. In the event a first reply is filed within

TWO MONTHS of the mailing date of this final action and the advisory action is not

mailed until after the end of the THREE-MONTH shortened statutory period, then the

shortened statutory period will expire on the date the advisory action is mailed, and any

extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

the advisory action. In no event, however, will the statutory period for reply expire later

than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the

examiner should be directed to Michael C. Colucci whose telephone number is (571)-

270-1847. The examiner can normally be reached on 9:30 am - 6:00 pm, Monday-

Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's

supervisor, Richemond Dorvil can be reached on (571)-272-7602. The fax phone

number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Michael C Colucci/
Examiner, Art Unit 2626
Patent Examiner
AU 2626
(571)-270-1847
Michael.Colucci@uspto.gov

/Richemond Dorvil/
Supervisory Patent Examiner, Art Unit 2626